WHAT IS CLAIMED IS:

Sub A3

1. A method of preparing a nucleic acid array on a support, wherein each nucleic acid occupies a separate known region of the support, said synthesizing comprising contacting said support with protected nucleoside phosphoramidite monomers having less than about 1 mole % of a phosphoramidite contaminant selected from the group consisting of $(MeO)(NCCH_2CH_2O)PN(iPr)_2$, $(MeO)P(N(iPr)_2)_2$, $(MeO)_2PN(iPr)_2$, and $(NCCH_2CH_2O)_2PN(iPr)_2$.

2. A method in accordance with claim **1**, said synthesizing further comprising:

(a) activating a region of the support;

(b) attaching a nucleotide to a first region, said nucleotide having a masked reactive site linked to a protecting group;

(c) repeating steps (a) and (b) on other regions of said support whereby each of said other regions has bound thereto another nucleotide comprising a masked reactive site link to a protecting group, wherein said another nucleotide may be the same or different from that used in step (b);

(d) removing the protecting group from one of the nucleotides bound to one of the regions of the support to provide a region bearing a nucleotide having an unmasked reactive site;

(e) binding an additional nucleotide to the nucleotide with an unmasked reactive site;

(f) repeating steps (d) and (e) on regions of the support until a desired pluarlity of nucleic acids is synthesized, each nucleic acid occupying separate known regions of the support; and

wherein said phosphoramidite contaminant is present in an amount of less than about 0.5 mole %.

3. A method in accordance with claim **1**, wherein said synthesizing comprises the sequential steps of:

a) generating a pattern of light and dark areas by selectively irradiating at least a first area of a surface of a substrate, said surface comprising immobilized nucleotides on said surface, said nucleotides capped with a photoremovable protective group, without irradiating at least a second area of said surface, to remove said protective

group from said nucleotides in said first area;

b) simultaneously contacting said first area and said second area of said surface with a first nucleotide to couple said first nucleotide to said immobilized nucleotides in said first area, and not in said second area, said first nucleotide capped with said photoremovable protective group;

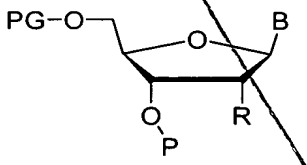
c) generating another pattern of light and dark areas by selectively irradiating with light at least a part of said first area of said surface and at least a part of said second area to remove said protective group in said at least a part of said first area and said at least a part of said second area;

d) simultaneously contacting said first area and said second area of said surface with a second nucleotide to couple said second nucleotide to said immobilized nucleotides in at least a part of said first area and at least a part of said second area;

e) performing additional irradiating and nucleotide contacting and coupling steps so that a matrix array of at least 100 nucleic acids having different sequences is formed on said support.

4. A method in accordance with claim **1**, wherein said contaminant is present in an amount of less than about 0.2 mole %.

5. A method in accordance with claim **1**, wherein said protected nucleoside phosphoramidite monomers have the formula:



wherein

B is a member selected from the group consisting of adenine, guanine, thymine, cytosine, uracil and analogs thereof;

R is a member selected from the group consisting of hydrogen, hydroxy, protected hydroxy, halogen and alkoxy;

P is a phosphoramidite group; and

PG is a photoremoveable protected group.

6. A method in accordance with claim **5**, wherein B is selected from the group consisting of adenine, guanine, cytosine and thymine and R is hydrogen.

7. A method in accordance with claim 5, wherein said array comprises at least 10 different nucleic acids.

8. A method in accordance with claim 5, wherein said array comprises at least 100 different nucleic acids.

9. A method in accordance with claim 5, wherein said array comprises at least 1000 different nucleic acids.

10. A method in accordance with claim 5, wherein said array comprises at least 10,000 different nucleic acids.

11. A method in accordance with claim 5, wherein said array comprises at least 100,000 different nucleic acids.

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12. A method in accordance with claim 5, wherein each different nucleic acid is in a region having an area of less than about 1 cm^2.

13. A method in accordance with claim 5, wherein each different nucleic acid is in a region having an area of less than about 1 mm^2.

14. A method in accordance with claim 5, wherein said phosphoramidite contaminant is present in an amount of less than 0.2 mole %.

15. A method in accordance with claim 5, wherein B is selected from the group consisting of adenine, guanine, cytosine and thymine, R is hydrogen, and said phosphoramidite contaminant is present in an amount of less than 0.2 mole %.

16. A method in accordance with claim 5, wherein B is selected from the group consisting of adenine, guanine, cytosine and thymine, R is hydrogen, PG is MeNPOC and said phosphoramidite contaminant is present in an amount of less than 0.2 mole %.

17. A method in accordance with claim 5, wherein B is selected from the group consisting of adenine, guanine, cytosine and thymine, R is hydrogen, PG is MeNPOC, P is $-P(OCH_2CH_2CN)N(iPr)_2$ and said phosphoramidite contaminant is present in an amount of less than 0.2 mole %.

18. A nucleic acid array prepared by the method of claim **1**.

19. A nucleic acid array prepared by the method of claim **5.**

20. A nucleic acid array prepared by the method of claim **17**.